

Claims

What is claimed is:

1. In a communication system, a method for providing adaptive Quality of Service (QoS), the method comprising the steps of:
 - 5 selecting, based on one or more QoS criteria corresponding to a client, one or more given data items suitable for sending to the client in response to a query from the client, the one or more given data items selected from a set of data items; and
 - 10 determining one or more statistics associated with the one or more given data items;
 - 15 wherein the one or more statistics are useable to modify which data items are included in the set of data items.
2. The method of claim 1, wherein the method further comprises the step of removing one of data items from the set of data items when the one data item has a corresponding statistic below a predetermined value.
3. The method of claim 1, wherein a given one of the one or more statistics corresponds to data format of the one or more given data items, and the data format comprises one or more of the following: file format of the one or more given data items; compression technique used to create the one or more given data items; compression level of the one or more given data items; image dimensions for the one or more given data items; and text size for the one or more given data items.
- 25 4. The method of claim 1, wherein the one or more QoS criteria comprise one or more of the following: a QoS subscription of a user, network constraints, device constraints, user preferences, a QoS level, and organizational policies.

5. The method of claim 1, wherein the one or more QoS criteria comprise one or more organizational policies and at least one of the one or more organizational policies comprises a cost.
- 5 6. The method of claim 1, wherein the one or more given data items comprise one or more of the following: images, text, audio, and video.
- 10 7. The method of claim 1, wherein the step of selecting one or more given data items further comprises the step of determining at least a portion of the one or more QoS criteria by using one or more of the following: a user identification corresponding to the client and a device identification corresponding to the client.
- 15 8. The method of claim 1, wherein there are a plurality of resources associated with the communication network and wherein the step of determining one or more given data items further comprises the step of determining if a given data item meets the one or more QoS criteria.
9. The method of claim 8, wherein:
the step of selecting one or more given data items further comprises the steps of:
20 if the given data item does not meet the one or more QoS criteria, determining another data item that exceeds the one or more QoS criteria; and
transcoding the other data item to meet the one or more QoS criteria; and
the method further comprises the step of communicating the transcoded other data item to the client.
- 25 10. The method of claim 8, wherein:
the step of selecting one or more given data items further comprises the step of determining another data item not meeting the one or more QoS criteria but coming closest, as compared to all other data items in the set of data items and as determined by a metric, to the one or more QoS criteria; and

the method further comprises the step of communicating the other data item to the client.

11. The method of claim 1, wherein the step of selecting one or more given data items
5 comprises the steps of:

transcoding a given one of the set of the data items in order to meet the one or more QoS criteria; and

storing the transcoded given data item as part of the set of data items.

10 12. The method of claim 1, wherein:

there is at least one resource associated with the communication network;

the one or more QoS criteria comprise a plurality of subscribed QoS levels, each subscribed QoS level corresponding to a data item in the set of data items;

there are a plurality of predetermined QoS levels, each corresponding to one of the

15 at least one resources and to a data item in the set of data items; and

the step of selecting one or more given data items further comprises the step of selecting the one or more given data items by using the plurality of predetermined QoS levels and the plurality of subscribed QoS levels.

20 13. The method of claim 12, wherein the step of selecting the one or more given data items by using the plurality of predetermined QoS levels and the plurality of subscribed QoS levels further comprises the steps of:

computing a value for a first equation comprising functions that provide weights using both selected ones of the predetermined QoS levels and selected ones of the subscribed 25 QoS levels, and comprising factors having differences between the selected ones of the predetermined QoS levels and the selected ones of the subscribed QoS levels, wherein the step of computing is performed subject to a resource constraint for each of the at least one resources; and

performing the step of computing until the value decreases a predetermined amount, wherein a result of the equation comprises the one or more given data items that meet 30 the QoS criteria of the plurality of subscribed QoS levels.

14. The method of claim 13, wherein the step of performing is repeated until the value is minimized.

5 15. The method of claim 1, wherein:
the query comprises a first query;
the method further comprises the step of shaping the first query to create a second query; and
the step of selecting one or more given data items further comprises the step of selecting, based on one or more QoS criteria, one or more given data items suitable for sending to the client in response to the second query.

16. The method of claim 15, wherein the first query comprises the one or more QoS criteria, and the step of shaping the query further comprises the step of using a combination of configuration information and a maximum QoS to modify the one or more QoS criteria to modified one or more QoS criteria, and wherein the step of selecting one or more given data items further comprises the step of selecting, based on the modified one or more QoS criteria, one or more given data items suitable for sending to the client in response to the second query.

20 17. In a communication system, an apparatus for providing adaptive Quality of Service (QoS), the apparatus comprising:
at least one computer system comprising:
one or more memories; and
one or more processors coupled to the one or more memories, the
25 one or more processors configured:
to select, based on one or more QoS criteria corresponding to a client, one or more given data items suitable for sending to the client in response to a query from the client, the one or more given data items are selected from a set of data items; and
to determine one or more statistics associated with the one or more given data
30 items;

wherein the one or more statistics are useable to modify which data items are included in the set of data items.

18. The apparatus of claim 17, wherein the one or more processors are further
5 configured to remove one of data items from the set of data items when the one data item has a corresponding statistic below a predetermined value.

19. The apparatus of claim 17, wherein a given one of the one or more statistics corresponds to data format of the one or more given data items, and the data format comprises
10 one or more of the following: file format of the one or more given data items; compression technique used to create the one or more given data items; compression level of the one or more given data items; image dimensions for the one or more given data items; and text size for the one or more given data items.

15 20. The apparatus of claim 17, wherein the one or more QoS criteria comprise one or more of the following: a QoS subscription of a user, network constraints, device constraints, user preferences, a QoS level, and organizational policies.

21. The apparatus of claim 17, wherein the one or more QoS criteria comprise one or
20 more organizational policies and at least one of the one or more organizational policies comprises a cost.

22. The apparatus of claim 17, wherein the one or more given data items comprise one or more of the following: images, text, audio, and video.

25 23. The apparatus of claim 17, wherein the one or more processors are further configured, when selecting one or more given data items, to determine at least a portion of the one or more QoS criteria by using one or more of the following: a user identification corresponding to the client and a device identification corresponding to the client.

24. The apparatus of claim 17, wherein there are a plurality of resources associated with the communication network and wherein the one or more processors are further configured, when determining one or more given data items, to determine if a given data item meets the one or more QoS criteria.

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25. The apparatus of claim 17, wherein the one or more processors are further configured, when selecting one or more given data items:

to transcode a given one of the set of the data items in order to meet the one or more QoS criteria; and

10 to store the transcoded given data item as part of the set of data items.

26. The apparatus of claim 17, wherein:

there is at least one resource associated with the communication network;

15 the one or more QoS criteria comprise a plurality of subscribed QoS levels, each subscribed QoS level corresponding to a data item in the set of data items;

there are a plurality of predetermined QoS levels, each corresponding to one of the at least one resources and to a data item in the set of data items; and

20 the one or more processors are further configured, when selecting one or more given data items, to select the one or more given data items by using the plurality of predetermined QoS levels and the plurality of subscribed QoS levels.

27. The apparatus of claim 17, wherein:

the query comprises a first query;

25 the one or more processors are further configured to shape the first query to create a second query; and

the one or more processors are further configured, when selecting one or more given data items, to select, based on one or more QoS criteria, one or more given data items suitable for sending to the client in response to the second query.

28. An article of manufacture for providing adaptive Quality of Service (QoS), the article of manufacture comprising:

a computer readable medium containing one or more programs which when executed implement the steps of:

5 selecting, based on one or more QoS criteria corresponding to a client, one or more given data items suitable for sending to the client in response to a query from the client, the one or more given data items are selected from a set of data items; and

determining one or more statistics associated with the one or more given data items;

10 wherein the one or more statistics are useable to modify which data items are included in the set of data items.